FIG. 1

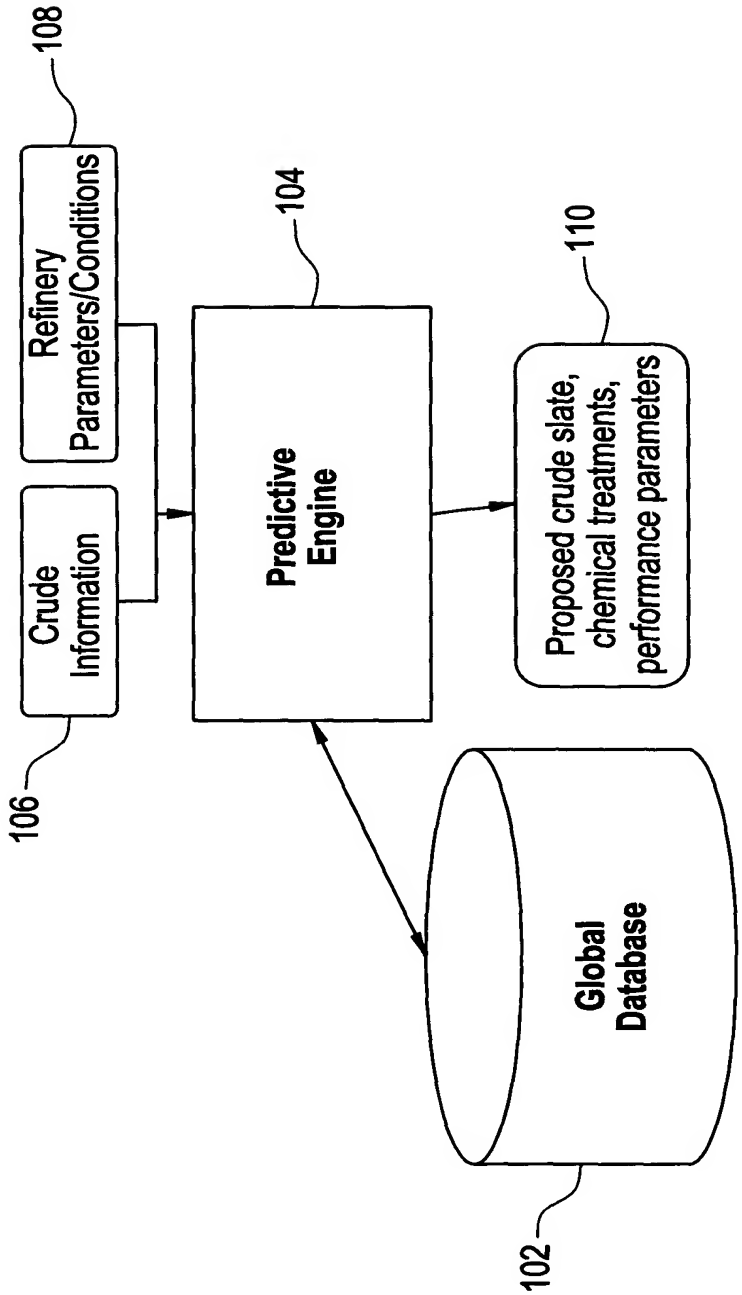
100
Crude Information
Refinery Parameters/Conditions
Predictive Engine
Proposed crude slate, chemical treatments, performance parameters
Global Database
106
108
104
110
102

FIG. 2

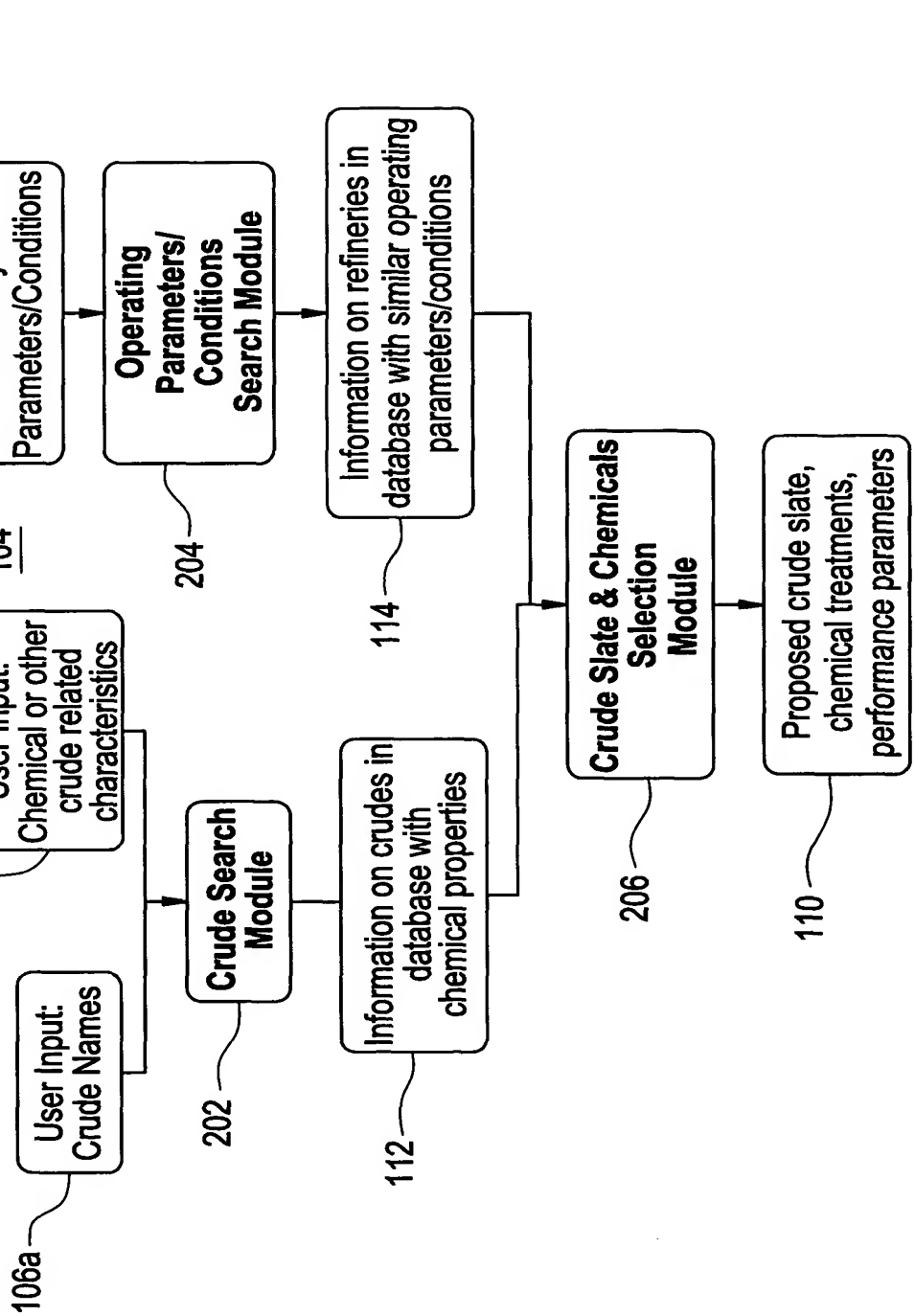
108
User Input: Refinery Parameters/Conditions
Operating Parameters/ Conditions Search Module
204
Information on refineries in database with similar operating parameters/conditions
114
104
User Input: Chemical or other crude related characteristics
106b
User Input: Crude Names
106a
Crude Search Module
202
Information on crudes in database with chemical properties
112
Crude Slate & Chemicals Selection Module
206
Proposed crude slate, chemical treatments, performance parameters
110

FIG. 3

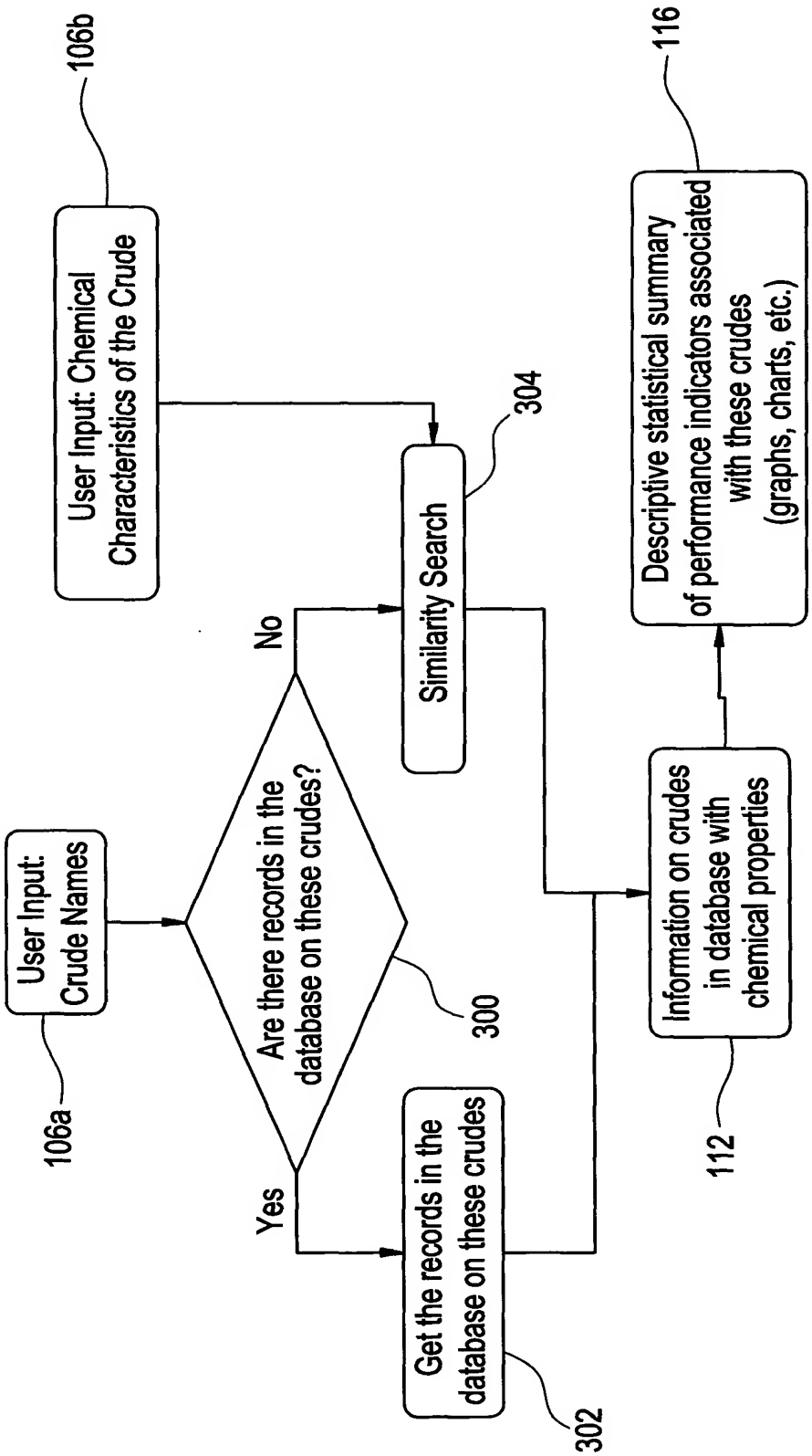
202
User Input: Chemical Characteristics of the Crude
106b
User Input: Crude Names
106a
Are there records in the database on these crudes?
300
No
Yes
Similarity Search
304
Get the records in the database on these crudes
302
Information on crudes in database with chemical properties
112
Descriptive statistical summary of performance indicators associated with these crudes (graphs, charts, etc.)
116

FIG. 4

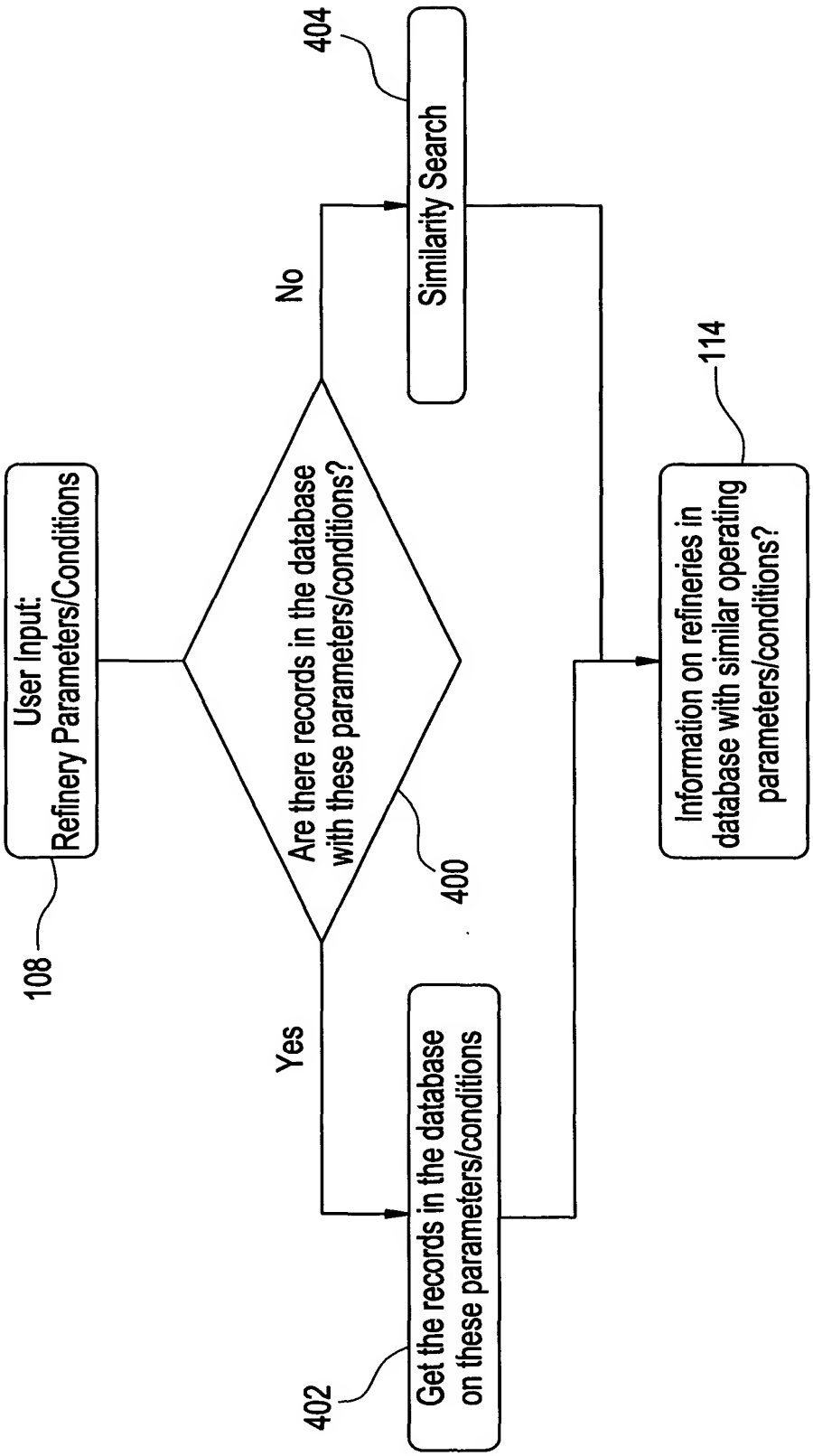
204
User Input:
Refinery Parameters/Conditions
108
Are there records in the database with these parameters/conditions?
400
Yes
No
Get the records in the database on these parameters/conditions
402
Similarity Search
404
Information on refineries in database with similar operating parameters/conditions?
114

FIG. 5

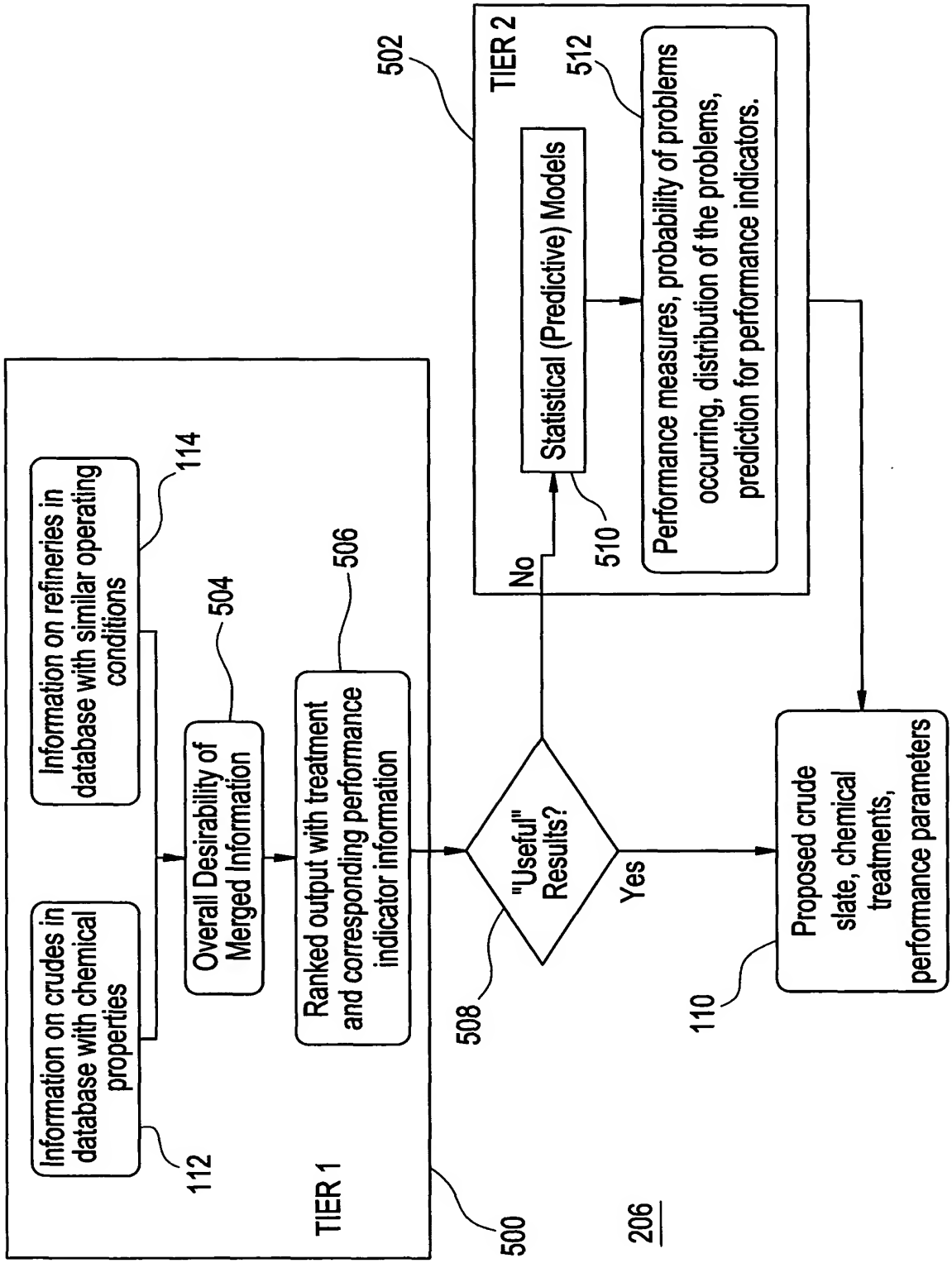
TIER 1
500
Information on crudes in database with chemical properties
112
Information on refineries in database with similar operating conditions
114
Overall Desirability of Merged Information
504
Ranked output with treatment and corresponding performance indicator information
506
"Useful" Results?
508
No
Yes
TIER 2
502
Statistical (Predictive) Models
510
Performance measures, probability of problems occurring, distribution of the problems, prediction for performance indicators.
512
Proposed crude slate, chemical treatments, performance parameters
110
206

FIG. 6

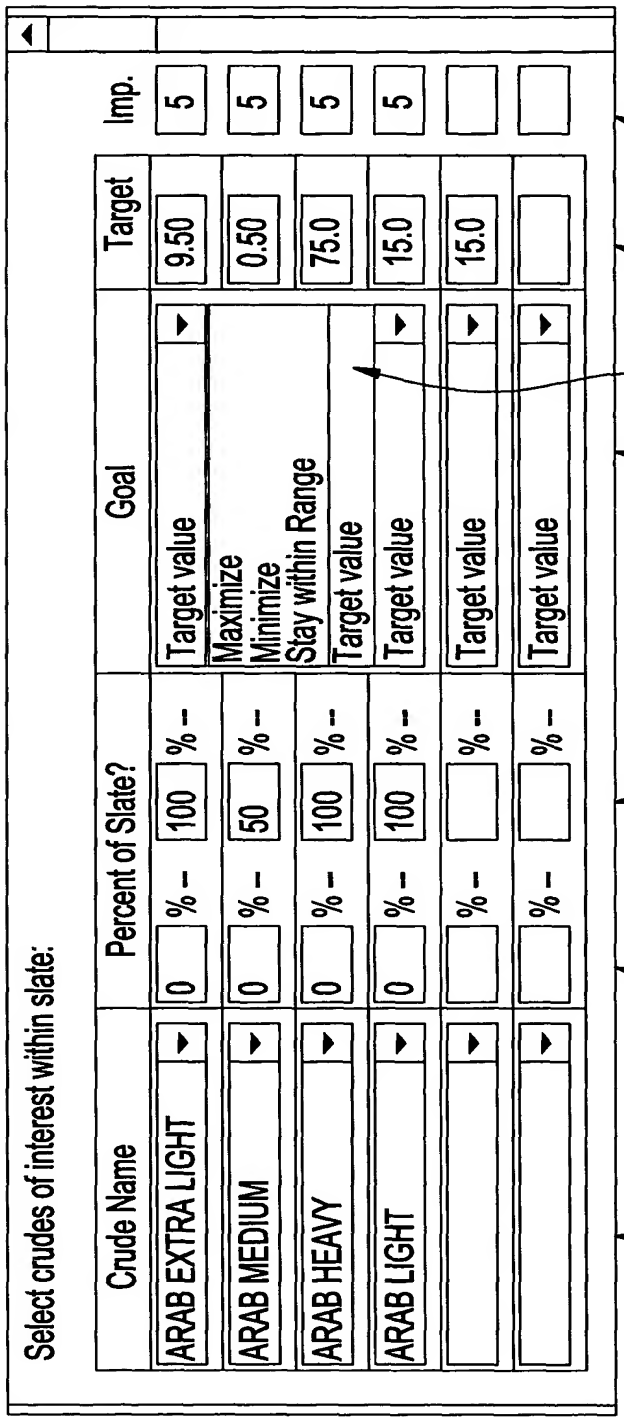
Select crudes of interest within slate:
Crude Name
Percent of Slate?
Goal
Target
Imp.
ARAB EXTRA LIGHT
0 % – 100 % –
Target value
9.50
5
ARAB MEDIUM
0 % – 50 % –
Maximize
Minimize
Stay within Range
0.50
5
ARAB HEAVY
0 % – 100 % –
Target value
75.0
5
ARAB LIGHT
0 % – 100 % –
Target value
15.0
5
% –
% –
Target value
15.0
% –
% –
Target value
600
602a
602
602b
604
604a
605
606

FIG. 7

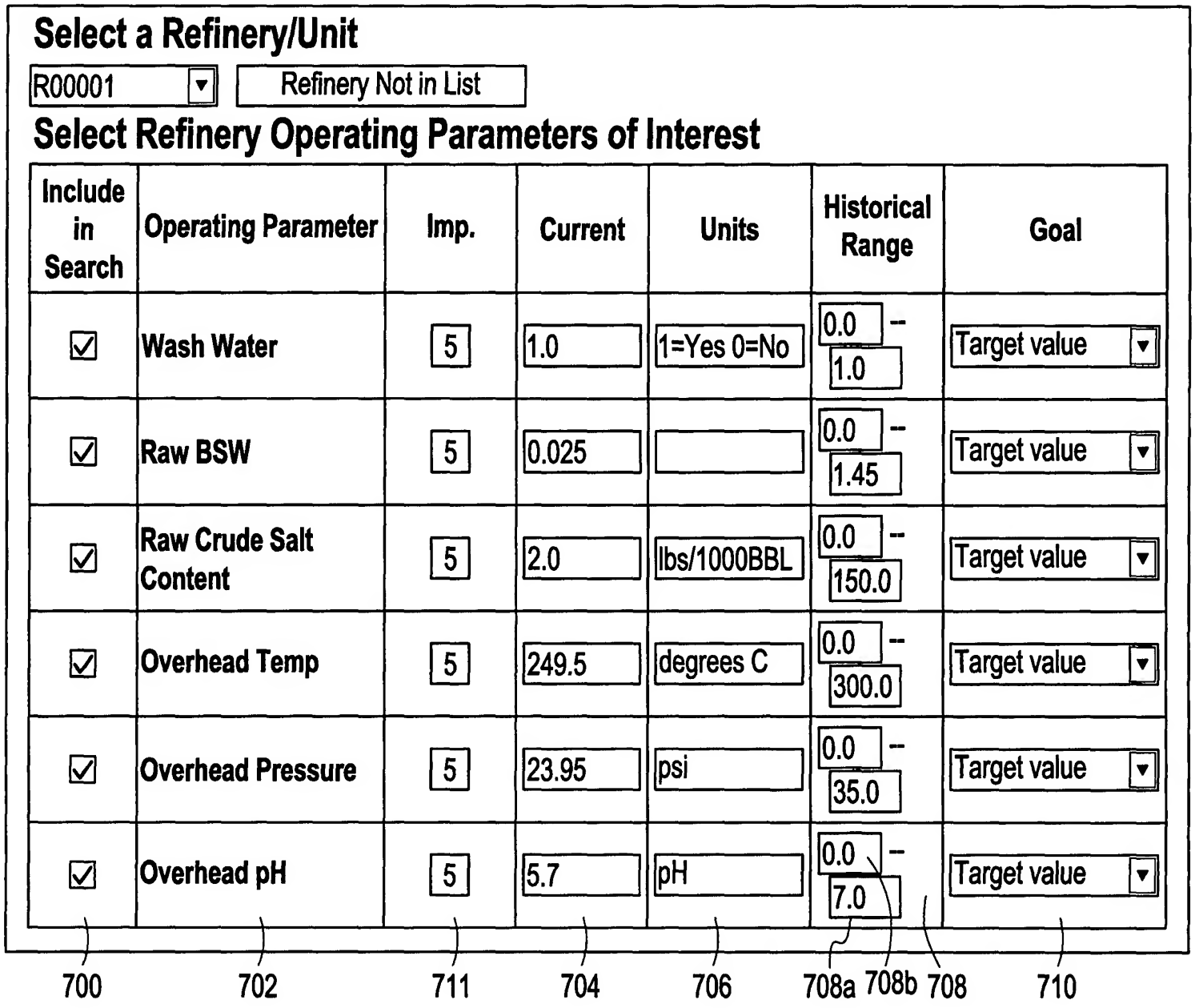
Select a Refinery/Unit
R00001
Refinery Not in List
Select Refinery Operating Parameters of Interest
Include in Search
Operating Parameter
Imp.
Current
Units
Historical Range
Goal
Wash Water
5
1.0
1=Yes 0=No
0.0 – 1.0
Target value
Raw BSW
5
0.025
0.0 – 1.45
Target value
Raw Crude Salt Content
5
2.0
lbs/1000BBL
0.0 – 150.0
Target value
Overhead Temp
5
249.5
degrees C
0.0 – 300.0
Target value
Overhead Pressure
5
23.95
psi
0.0 – 35.0
Target value
Overhead pH
5
5.7
pH
0.0 – 7.0
Target value
700
702
711
704
706
708a
708b
708
710

FIG. 8

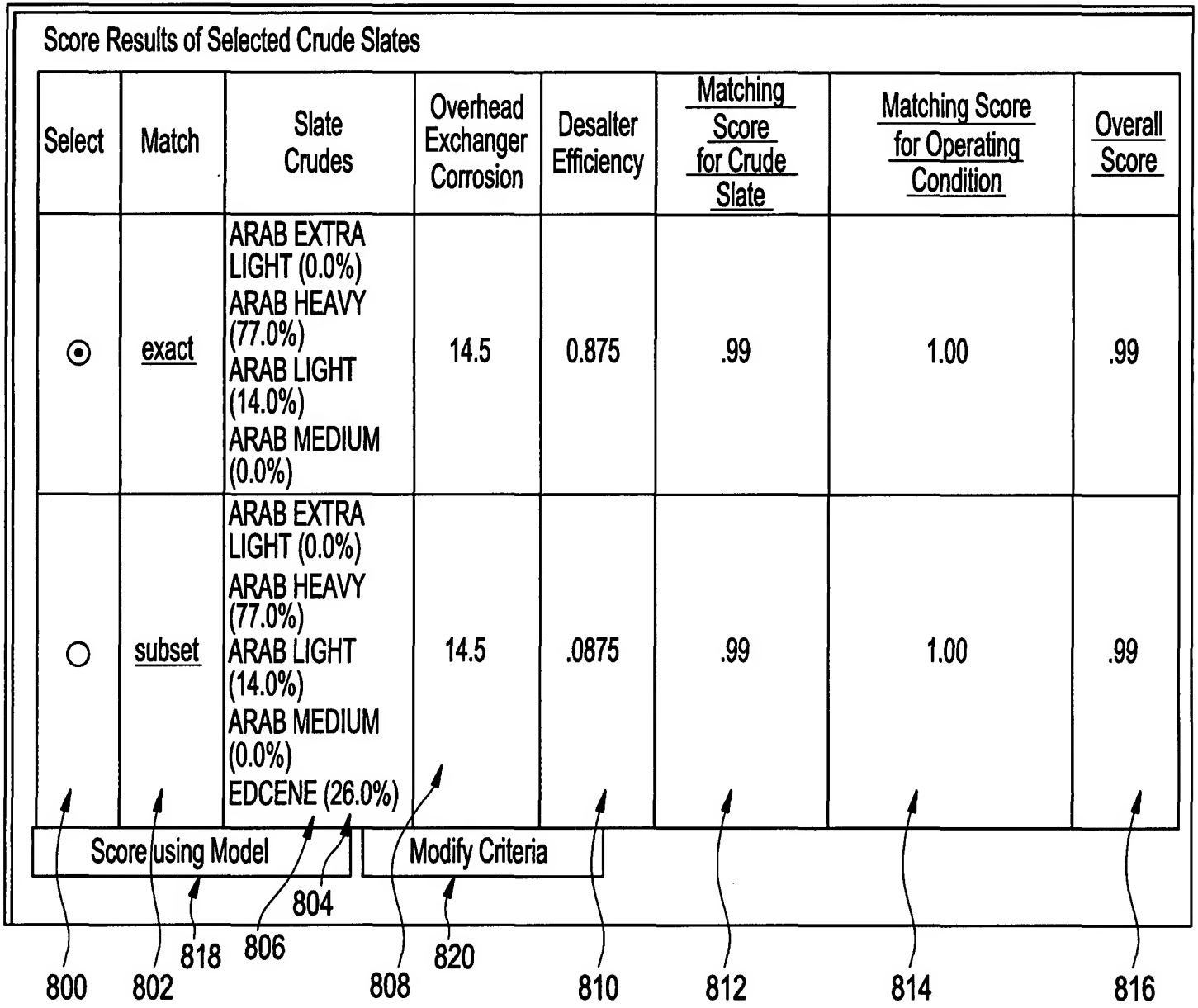
Score Results of Selected Crude Slates
Select
Match
Slate Crudes
Overhead Exchanger Corrosion
Desalter Efficiency
Matching Score for Crude Slate
Matching Score for Operating Condition
Overall Score
exact
ARAB EXTRA LIGHT (0.0%) ARAB HEAVY (77.0%) ARAB LIGHT (14.0%) ARAB MEDIUM (0.0%)
14.5
0.875
.99
1.00
.99
subset
ARAB EXTRA LIGHT (0.0%) ARAB HEAVY (77.0%) ARAB LIGHT (14.0%) ARAB MEDIUM (0.0%) EDCENE (26.0%)
14.5
.0875
.99
1.00
.99
Score using Model
Modify Criteria
800
802
818
806
804
808
820
810
812
814
816

FIG. 9A

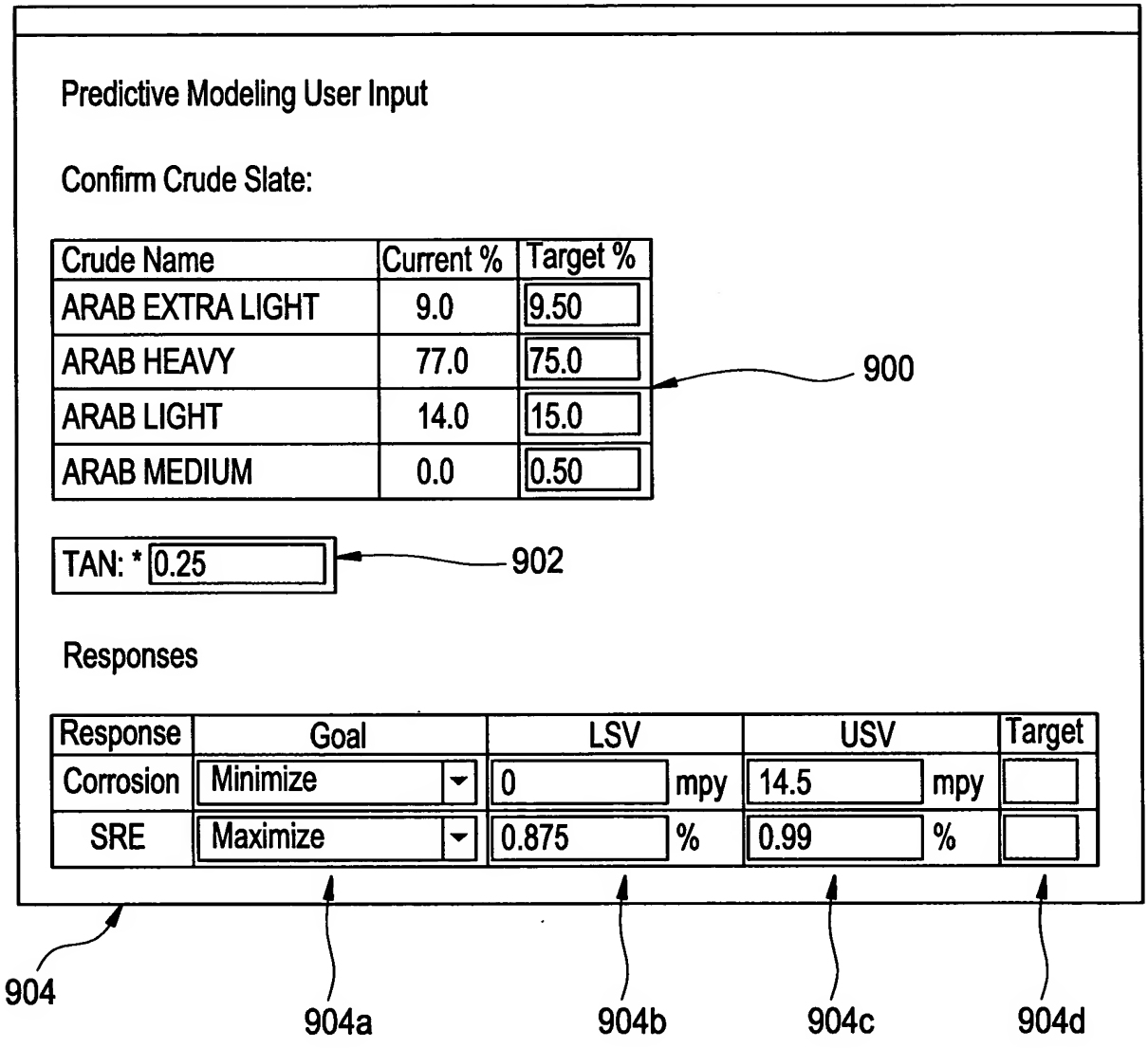
Predictive Modeling User Input
Confirm Crude Slate:
Crude Name
Current %
Target %
ARAB EXTRA LIGHT
9.0
9.50
ARAB HEAVY
77.0
75.0
ARAB LIGHT
14.0
15.0
ARAB MEDIUM
0.0
0.50
900
TAN: * 0.25
902
Responses
Response
Goal
LSV
USV
Target
Corrosion
Minimize
0
mpy
14.5
mpy
SRE
Maximize
0.875
%
0.99
%
904
904a
904b
904c
904d

FIG. 9B

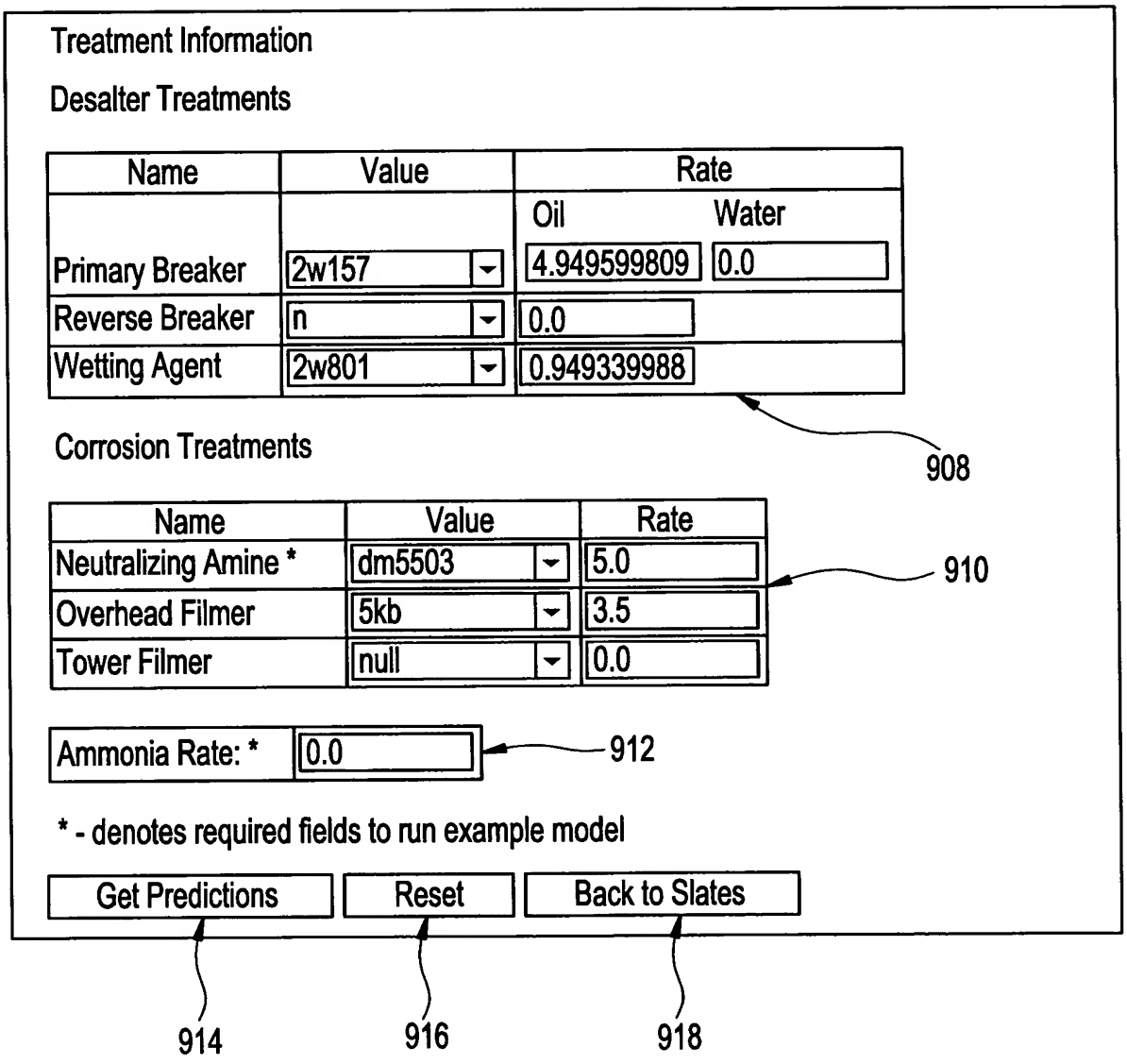
Treatment Information
Desalter Treatments
Name
Value
Rate
Oil
Water
Primary Breaker
2w157
4.949599809
0.0
Reverse Breaker
n
0.0
Wetting Agent
2w801
0.949339988
908
Corrosion Treatments
Name
Value
Rate
Neutralizing Amine *
dm5503
5.0
910
Overhead Filmer
5kb
3.5
Tower Filmer
null
0.0
Ammonia Rate: *
0.0
912
* - denotes required fields to run example model
Get Predictions
Reset
Back to Slates
914
916
918

FIG. 10

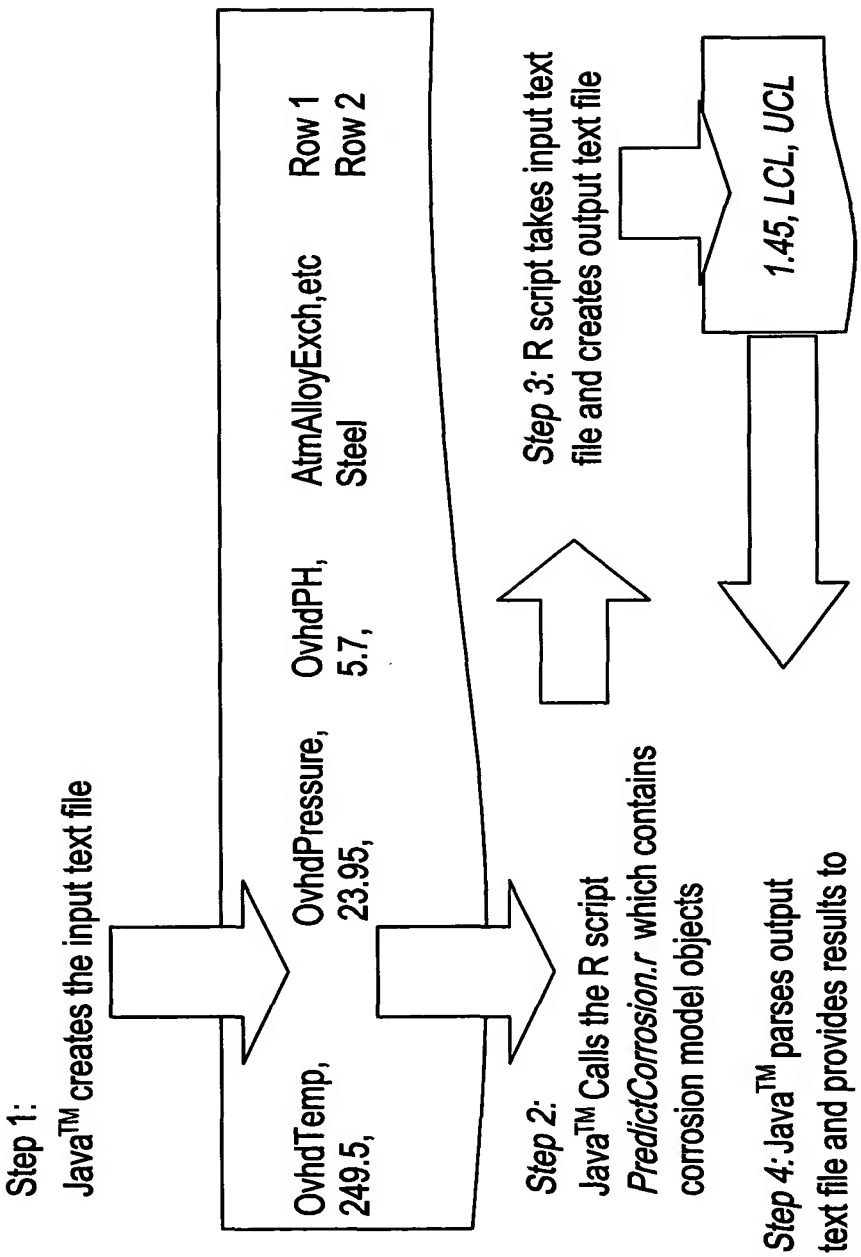
Step 1:
Java™ creates the input text file
OvhdTemp, 249.5,
OvhdPressure, 23.95,
OvhdPH, 5.7,
AtmAlloyExch,etc
Steel
Row 1
Row 2
Step 2:
Java™ Calls the R script PredictCorrosion.r which contains corrosion model objects
Step 3: R script takes input text file and creates output text file
1.45, LCL, UCL
Step 4: Java™ parses output text file and provides results to user

FIG. 11

Top 10 Predicted Value/Scores - mock-up only

Prediction Record	Slate Score	Treat Score	Operating Condition Score	Response - Corrosion	Response - SRE	Composite Score
1	.99	1	1.00	1.45		.99
** Prediction 1 is calculated using model. Predictions 2 through 10 are simulated for for demo purposes, but will be calculated in future.*						
2	.99	1	1.00	.46		.99
3	.99	1	1.00	.28		.99
4	.99	1	1.00	.66		.99
5	.99	1	1.00	.84		.99
6	.99	1	1.00	.77		.99
7	.99	1	1.00	.58		.99
8	.99	1	1.00	.86		.99
9	.99	1	1.00	.90		.99
10	.99	1	1.00	.85		.99

Back to Model Input